

A NEW SPECIES OF RIPARIAN NABIDAE (HETEROPTERA) FROM THE HAWAIIAN ISLANDS

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Abstract.—A new species of Hawaiian Nabidae, *Nabis gagneorum*, is described from the islands of Maui and Molokai. This species is unusual among Nabidae in that it occurs in wet riparian habitats within and adjacent to swift streams. Figures of the male and female dorsal habitus and male paramere are provided, accompanied by a distribution map.

Key Words: Nabidae, riparian, Hawaiian Islands, Maui, Molokai

The damsel bugs in the genus *Nabis* have undergone a spectacular insular radiation in the Hawaiian Islands. Twenty-six endemic species are currently described from the islands (Zimmerman 1948), and an additional 27 new taxa are at hand in existing collections. As with many other Hawaiian insect radiations, the endemic Nabidae have diversified into a wide range of morphologically and ecologically divergent forms radically different from those seen elsewhere in the world. Among the most ecologically remarkable of these is a new riparian species, *N. gagneorum*, described below. This is the only riparian nabid so far documented, and its odd habits are yet another example of the unique adaptive shifts that often occur on isolated oceanic islands.

The presence of a riparian nabid in Hawaii was first brought to the attention of the author by the late Wayne Gagné during a visit to the Bishop Museum in 1986. Gagné had but a single specimen of this insect, and the brief nature of the visit did not allow a detailed analysis of its features. Following Gagné's untimely death in 1987, and a subsequent rehousing of the collection in a new compactor, the whereabouts of this speci-

men became obscure. In 1991, Frank Howarth, also of Bishop Museum, led the author to Iao Valley in the West Maui Mountains, the locality from which the original specimen had come, in an attempt to secure further collections. This foray was successful, and also allowed more detailed observation of this insect's unusual riparian habits. Once these latter were better understood and brought to the attention of collectors, it was possible to obtain additional specimens during the mid-1990's from various tributaries of Iao Valley, and from neighboring Olowalu and Honokohau valleys. Finally, in early 1997, a short series was taken from the East Fork of Kawela Gulch in the mountains of eastern Molokai, a surprising discovery indicating that the insect may be distributed in riparian habitats on all of the high volcanoes occupying the Maui Nui platform (i.e., West Maui, Haleakala, Molokai, and Lanai).

All measurements in the description below are given in millimeters. The holotype of *Nabis gagneorum* is deposited in the Bishop Museum, Honolulu, Hawaii (BPBM). Paratypes are deposited in that collection, at Cornell University, Ithaca,

New York (CUIC), and in the National Museum of Natural History, Smithsonian Institution, Washington, DC (USNM).

***Nabis gagneorum* Polhemus, new species**
(Figs. 1–5)

Diagnosis.—A riparian species currently known from the West Maui Mountains (Fig. 4) and eastern Molokai (Fig. 5). Recognized by its dark coloration, semiaquatic habits, brachypterous wing form (Figs. 1, 3), and distinctive male parameres (Fig. 2).

Description.—*Brachypterous male*: Overall length 7.80, maximum width (across abdomen) 2.20; general appearance as in Fig. 1. General coloration of living specimens dark brown with a few scattered dark-yellow markings dorsally on head, thorax and hemelytra; legs paler than body, medium brown, becoming yellowish brown on basal segments; ventral body surfaces dark brown.

Head elongate, well produced both ahead of and behind eyes, length/width = 1.40/1.05, covered by a layer of short, pale, recumbent setae; width of vertex 1.50× the dorsal width of an eye (0.45/0.30); length of preocular portion of head 1.87× the dorsal length of an eye (0.75/0.40); length of postocular portion of head equal to 0.55× the dorsal length of an eye (0.25/0.40); ocelli well developed; length of antennal segments I–IV = 1.55/2.05/2.25/1.65; rostrum length 3.45, extending to bases of mesocoxae, lengths of segments I–IV = 0.35/1.30/1.30/0.50; coloration of head dark brown, with elongate yellowish patches along inner margins of eyes, tylus medium brown, elongate, shining; antennal segments I–IV uniformly yellowish brown except for single dark brown annulation near tip of segment II; eyes and ocelli red.

Pronotum trapezoidal, length/width = 1.65/1.67, covered by an obscure layer of very short, pale, recumbent setae; anterior collar well developed; anterior pronotal lobe weakly swollen and tumescent; posterior pronotal lobe short, not raised, posterior margin straight; overall pronotal col-

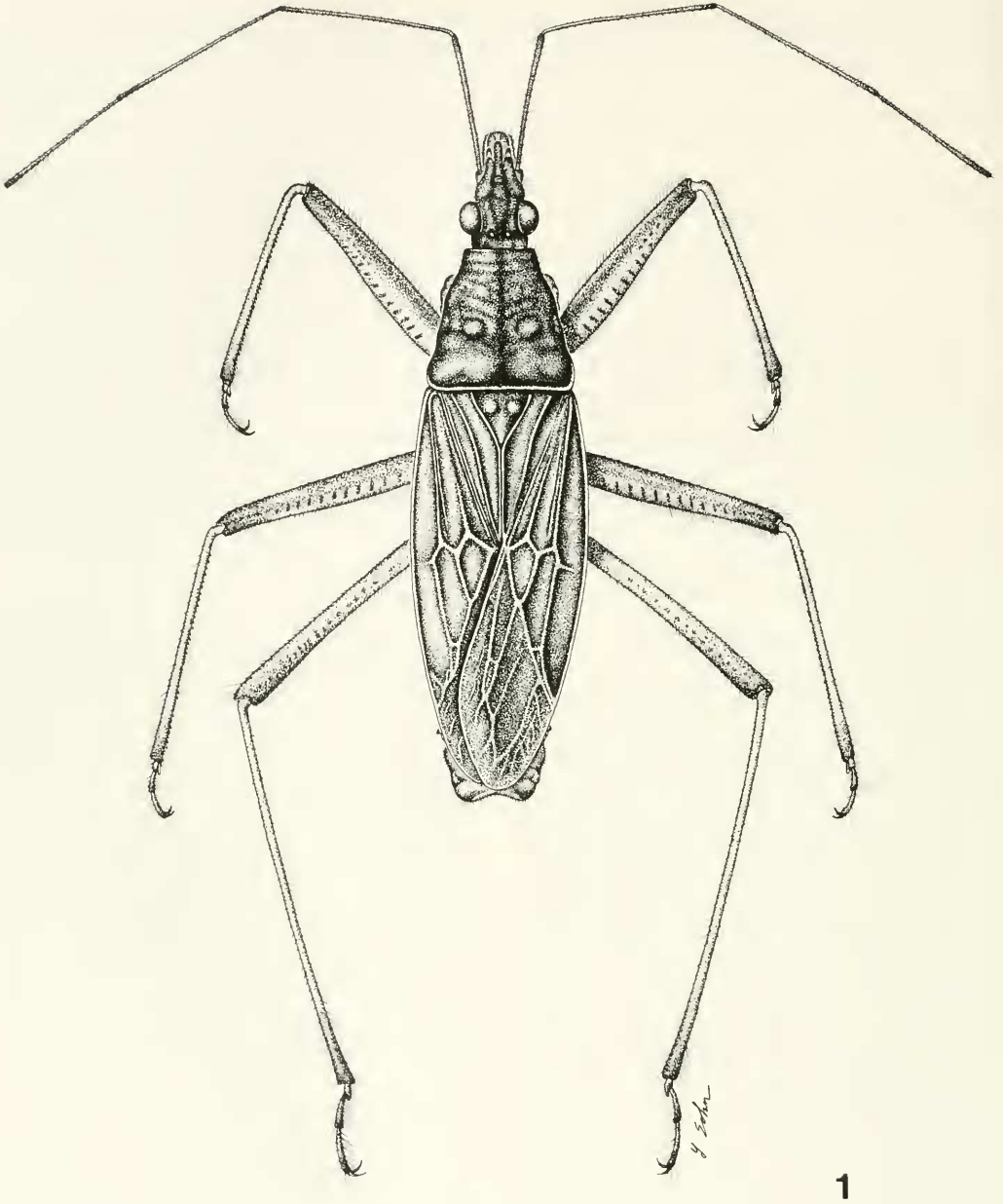
oration dark brown, with extreme posterior margin narrowly dark yellow.

Scutellum elongate and triangular, slightly raised at apex and to either side of midline basally, length/width = 0.57/0.60, covered with scattered short, pale, recumbent setae; coloration dark brown, often nearly black centrally, with a pair (1+1) of yellow spots to either side of midline on basal half.

Hemelytra elongate, submacropterous, extending to tip of abdomen, bearing scattered short, pale, recumbent setae; posterior margins acutely rounded, tips overlapping or very weakly divergent, membrane well developed, venation of corium and membrane well defined; coloration of corium dark brown with a few diffuse dark yellow maculations along veins, membrane leathery, fumate, with veins dark brown.

Legs elongate, with fore coxa approximately 2× as long as thick (0.75/0.45); fore femur fusiform, nearly 6× longer than wide (3.00/0.50), densely covered with short, pale, semi-recumbent setae; fore tibia slender, widening slightly at tip, inner margin bearing two parallel rows of 50–60 tiny black teeth bordered by pale, erect setae, outer margin bearing semi-erect pale setae; middle and hind femora, tibiae and tarsi slender, covered with short, pale, semi-erect setae; coloration of legs yellowish brown on tibiae and tarsi, all femora medium brown spotted with dark brown on distal sections, becoming yellowish brown at extreme bases, coxae and trochanters yellowish; all tibiae lacking dark annulations; lengths of leg segments as follows: fore femur/tibia/tarsomere 1/tarsomere 2/tarsomere 3 = 3.00/2.50/0.05/0.25/0.35; middle femur/tibia/tarsomere 1/tarsomere 2 = 2.90/2.75/0.10/0.30/0.37; hind femur/tibia/tarsomere 1/tarsomere 2 = 3.90/4.65/0.10/0.45/0.50.

Abdomen with extreme lateral portions of tergites III–VI exposed beyond lateral margins of hemelytra, lateral margins of these tergites broadly arcuate, segments VII and VIII narrowed, forming a box-like genital capsule, all tergites covered by an obscure



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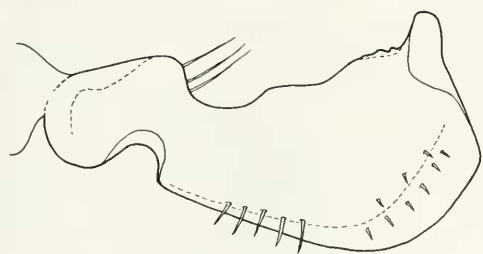
Fig. 1. *Nabis gageorum*, male, shaded dorsal habitus.

layer of short, pale, recumbent setae; coloration of exposed tergites dark brown, with dark yellow markings at posterolateral angles.

Ventral surface dark brown, covered by short, pale, recumbent setae; round, dark yellow markings present around spiracles

along abdominal paratergites I–VI, and irregular, transverse dark yellow patches present centrally along abdominal ventrites II–VI; tip of genital segment dark yellow.

Genitalia with basal section of paramere slender, distal section greatly expanded, ventral margin broadly arcuate, dorsal mar-



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Fig. 2. *Nabis gagneorum*, male right paramere.

gin produced to a finger-like projection at tip (Fig. 2).

Brachypterous female: Length 8.30, maximum width (across abdomen) 2.90. Similar to brachypterous male in general structure and coloration but broader and more robust (Fig. 3); abdomen projecting laterally well beyond margins of hemelytra, exposing lateral portions of dark, shining-brown abdominal tergites and connexiva; abdomen also projecting posteriorly well beyond tips of hemelytra.

Etymology.—Named for Wayne and Betsy Gagné, whose combined efforts have done much to advance our knowledge of the remarkable Hawaiian Heteroptera biota.

Ecological associations.—Occurs on mossy rocks in and adjacent to swift mountain streams, and on wet bedrock walls bordering such streams.

Material examined.—Holotype, brachypterous ♂: HAWAIIAN ISLANDS, Maui, West Maui Mountains, Iao Valley, wet rock face above major stream junction [confluence of Nakalaloa and Poohahoahoa streams], 17 August 1991, CL 2563, J. T. and M. S. Polhemus (BPBM). Paratypes (all brachypterous): HAWAIIAN ISLANDS, Maui: 4 ♂, 1 ♀, same data as holotype (BPBM, USNM); 1 ♀, West Maui Mountains, Iao Valley, near lookout, 1 January 1973, F. G. Howarth, on rock near stream (BPBM); 1 ♀, West Maui Mountains, Iao Valley, 330 m. (1,000 ft.), on wet rock face above main Iao Stream, 16 August 1992, D. A. Polhemus (BPBM); 3 ♂, 2 ♀, West Maui Mountains, Iao Valley, along Ae Stream at head of Black Gorge,

365 m. (1,200 ft.), on wet rock face above stream, 17 May 1993, D. A. Polhemus (BPBM, USNM); 1 immature, West Maui Mountains, Olowalu Stream in upper Olowalu Valley, 365 m. (1,200 ft.), water temp. 19.5°C., 21 July 1994, 09:00–17:00 h, CL 8204, D. A. Polhemus (BPBM); 1 ♀, West Maui Mountains, Honokohau Stream, 395 m. (1,300 ft.), on boulders at streamside, 3 March 1998, H. Oppenheimer (USNM); 1 ♂, Molokai, East Fork Kawela Gulch at Puu Kolekole trail, TNCH Kamakou Preserve, Molokai Forest Reserve, 1,095 m. (3,600 ft.), 21°06'42"N, 156°54'26"W, water temp. 15°C., 28 May 1997, J. K. Liebherr (USNM); 1 ♀, 4 immatures, same locality as above but 31 May 1997, CL 8069, D. A. Polhemus (USNM).

Discussion.—Among the native Hawaiian Nabidae, *N. gagneorum* may be distinguished by its dark-brown coloration, submacropterous wing condition (Fig. 1), and distinctively shaped male paramere (Fig. 2). It is one of the few submacropterous Hawaiian nabids known to occur on more than a single island.

Nabis gagneorum is the first nabid to be discovered that is strictly confined to riparian habitats. At Black Gorge on Ae Stream, a tributary to Iao Valley in the West Maui Mountains, individuals were taken from vertical seeping rock faces adjacent to the stream, and on wet midstream rocks, with both adults and immatures found in these areas. Since *N. gagneorum* is a flightless species, the individuals discovered on midstream rocks must have arrived there by either passing through the stream waters, or by dispersing to these rocks at a lower stage of stream flow. The presence of immatures on the midstream rocks clearly indicated that the species was breeding there. Saldidae, which are the typical riparian Heteroptera in Hawaii (and elsewhere in the world), were also abundant at Black Gorge, but *N. gagneorum* was much larger in size than the largest saldid species present (*Saldula exulans* White), and thus appeared to

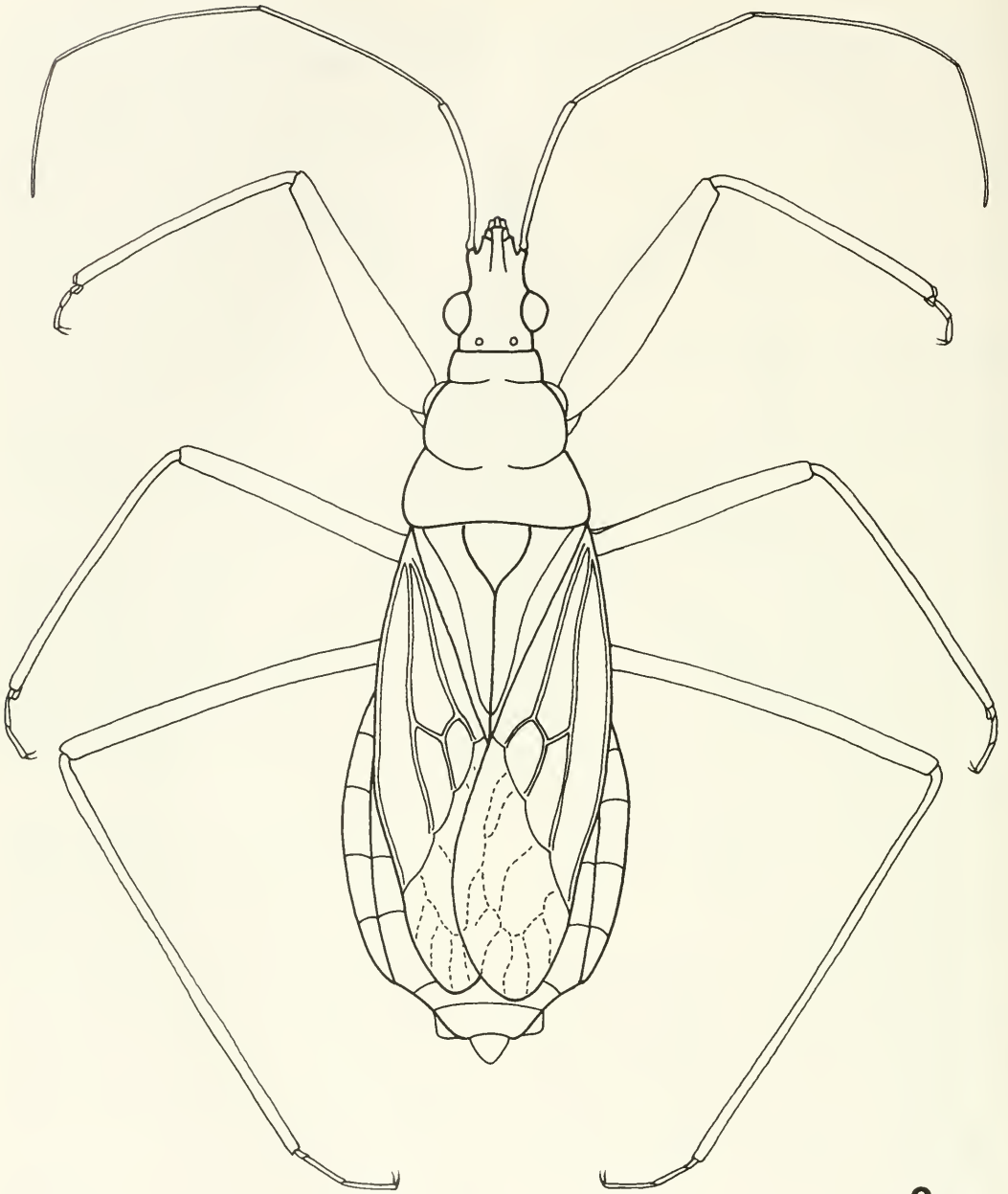
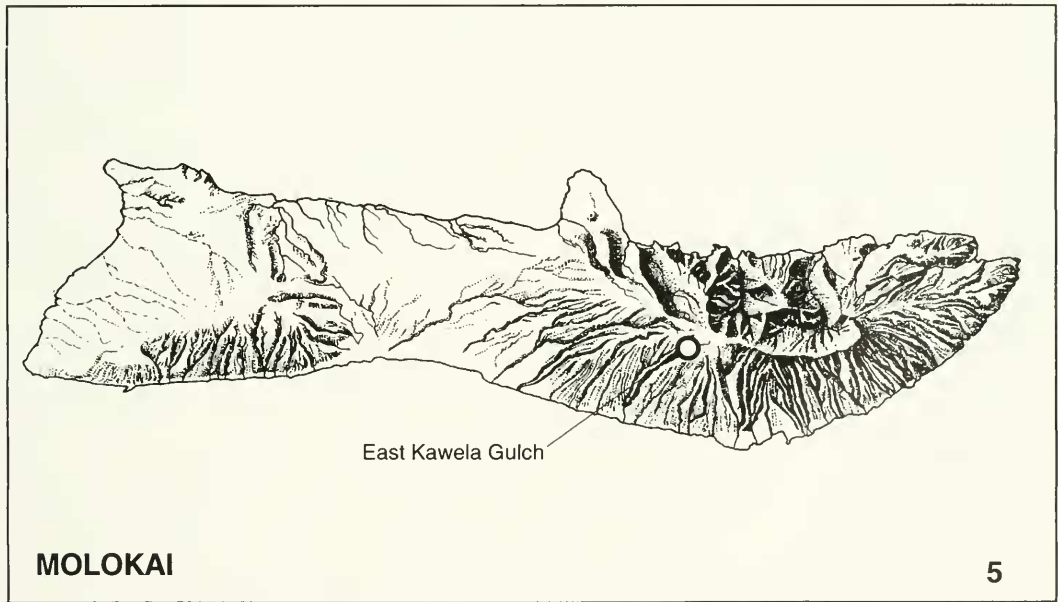
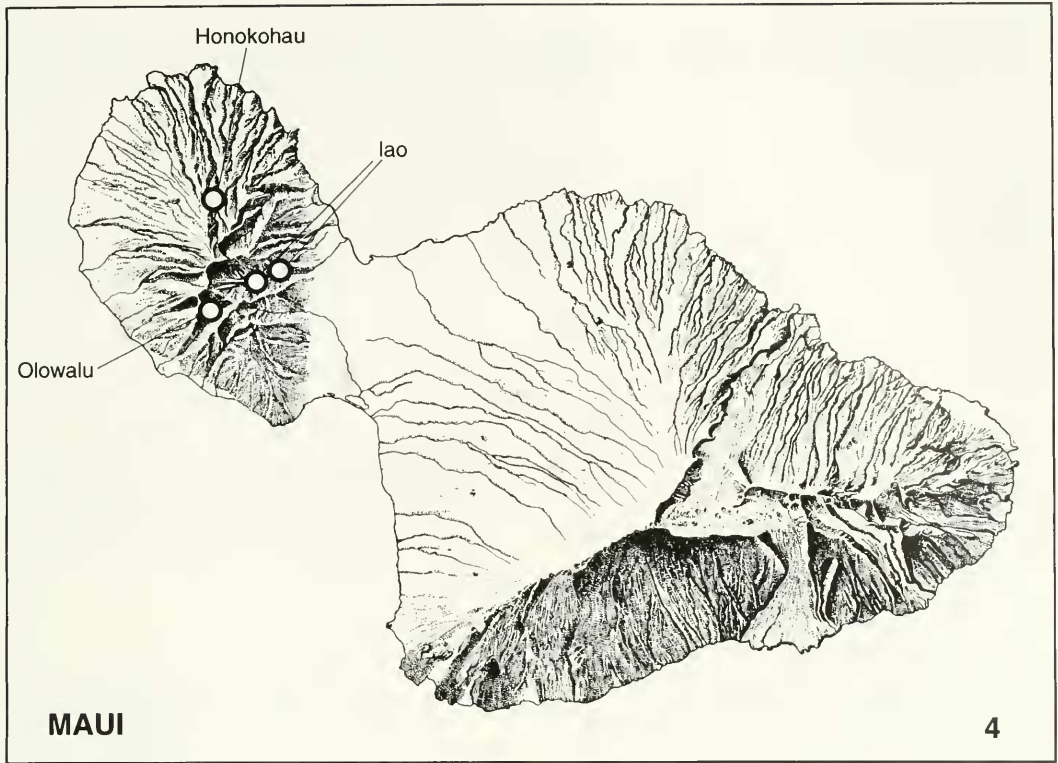
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Fig. 3. *Nabis gageorum*, female, dorsal habitus.

be occupying a slightly different riparian niche.

The series from Molokai was taken from moss covered rocks and bedrock exposures in the bed of the East Fork of Kawela Gulch just above the crossing of the Puu Kolekole

trail. The first specimen taken, a male, was discovered while splashing the moss mats along the margin of a pool, in search of riparian Carabidae; subsequent specimens were obtained by lightly fogging these moss mats with a weak pyrethrin spray,



Figs. 4-5. Distribution of *Nabis gagneorum*. 4, Maui. 5, Molokai.

which caused the nabids to emerge from their hiding places. Visual searches and dismemberment of the moss mats in the absence of pyrethrin application proved useless, and demonstrated the ability of this species to elude detection by casual collectors using traditional techniques. Given this, it seems likely that diligent searches may produce additional collections of this species along other mossy streams on Molokai, the West Maui Mountains, and possibly Haleakala.

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I also wish to express my gratitude to Young T. Sohn of the Smithsonian Institution, who produced the excellent shaded habitus illustration.

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